

REMARKS

Claims 1-7 were pending and rejected, as set forth below. Applicant has amended claim 1 and claim 6, and added dependent claim 38. Applicant respectfully submits that the claims are now in condition for allowance and respectfully requests reconsideration and further examination in view of the following.

A. Amendments.

Claim 1 has been amended to remove the limitations of flat, shallow threads (which are now in dependent claim 38), and to add the limitation of the projection being removably received in the keyway.

B. Rejections under 35 U.S.C. §103(a).

Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,345,964 (“*Cooper ‘964*”), U.S. Patent 6,398,525 (“*Cooper ‘525*”), or U.S. Patent 5,203,681 (“*Cooper ‘681*”) in view of U.S. Patent No. 5,092,821 (“*Gilbert ‘821*”). Applicant has reviewed the Office Action and respectfully submit that there is no *prima facie* case of obviousness, as explained below.

1. Telephonic Interview.

Applicant thanks the Examiner for the telephonic interview on January 18, 2008. During the interview, agreement was reached that the currently pending claims would be found distinguishable over the cited art if Applicant provided convincing arguments/showings demonstrating that: (1) *Gilbert ‘821* employs refractory cement to retain the dowels 52 within the openings 50 together, and (2) the present invention employs a removable connection between the projection of the second coupling member and the keyway. Applicant respectfully submits that the arguments provided below in section A.2.a demonstrate both points.

2. The Proposed Combination Lacks the Limitations of the Present Invention.

Applicant submits that none of the references teaches at least (1) a keyway formed in a shaft and a projection on a coupling that is received in the keyway, or (2) a connective portion of a rotor that includes flat, shallow threads that receives a second end of a rotor shaft that also has flat, shallow threads. See claims 1 and 8, and Figs. 4, 6, 11-13.

a. The Proposed Combinations Lack a Projection and a Keyway.

The portion of *Gilbert ‘821* cited by the Examiner specifically teaches that it does not use a projection or keyway as claimed herein, but instead uses a cemented dowel pin arrangement.

Further, *Gilbert '821* does not relate to driving the rotor shaft, but relates to a connection between the rotor shaft and impeller.

"In order to prevent relative rotational movement between the impeller 14 and the shaft 18, a plurality of openings 50 are formed in the impeller 14 and the shaft 18 at the interface between the two. The openings 50 are aligned with the longitudinal axis of the shaft 18. **Dowels 52 (FIG. 10) are inserted into the openings 50 and retained there by means of refractory cement.** The dowels 52 thus function as keys." *Gilbert '821*, Col. 5 lines 1-8 (emphasis added).

Thus, *Gilbert '821* explicitly states that the dowels 52 are permanently cemented into the openings in the shaft and impeller.

Applicant directs the Examiner to Figures 3-4 and 8-9 of the present application, which show the key (the projection 212 from the second coupling member 204) and keyway 52. The projection 212 is a metal piece attached or formed in the second coupling member 204 and the keyway 52 is an elongated, axially extending groove in the shaft 44. The coupling 200 receives the first end 48 of shaft 44 in cavity 206, with the projection 212 being received in the keyway 52. With this arrangement, more force can be transferred to the shaft with less of a risk of damaging the shaft than standard coupling arrangements utilizing (1) a bore through the shaft, and (2) a bolt positioned in the bore and attached to the coupling, wherein as the coupling turns the bolt applies force to the shaft to turn it. In the present invention, the projection 212 and the keyway 52 are not cemented together, which allows the coupling 200 and shaft 44 to be disengaged from each other for quick and easy maintenance of the pump. This is contrary to the shaft and impeller in *Gilbert '821*, which are permanently affixed to each other using dowels 52 cemented in openings 50. The entire shaft-impeller assembly in *Gilbert '821* would have to be removed together. Using such an arrangement to engage the rotor shaft and coupling would be time consuming (and more expensive) if the shaft had to be chiseled from or otherwise removed from the coupling and/or if the coupling had to be removed and replaced in order to replace the shaft. Additionally, the suggested dowel arrangement of *Gilbert '821* would require a complete redesign of prior art couplings, and there is no teaching or motivation in the prior art to make such a proposed design change.

Finally, Applicant notes that there is a long-felt need for the present invention. Graphite shafts are known to be soft and to wear at pressure points, especially pressure points where the graphite directly contacts a harder material such as a steel coupling or bolt. The problem of a

graphite shaft wearing at the place where it is driven by a bolt positioned in a bore through the shaft has been known, yet no one else has developed the solution described herein.

Thus, *Gilbert* '821 does not teach a second coupling member having a projection that is removably received in a keyway, and this alone is sufficient to distinguish claim 1 over the cited art.

b. The Proposed Combinations Would Lack Flat, Shallow Threads As Set Forth in Claim 8.

Finally, none of the references include flat, shallow threads as recited in claim 8 and shown in, for example, Figs. 6, 11-13. The flat, shallow threads alleviate breakage of the threads. See Specification ¶ 41. Applicant respectfully disagrees with the Examiner's characterization in the Office Action that "all of the threads of the applied references include flat portions and could all be considered "shallow" when compared to some other thread depth." Office Action, Response to Arguments Section (emphasis added). Independent claim 8 recites a second shaft end having "flat, shallow threads." Claim 8 does not recite threads that merely "include flat portions" as stated by the Examiner. Claim 8 also does not recite threads that are "'shallow' when compared to some other thread depth." All claim limitations are significant, and must be given weight and effect with respect to the patentability of the claim. Application of Saether, 492 F.2d 849 at 852 (C.C.P.A. 1974). If even a single claim limitation is not taught or suggested by the cited references, then that claim cannot be obvious over the cited references. Application of Glass, 472 F.2d 1388 at 1392 (C.C.P.A. 1973).

Here, the Examiner has not identified any portion of a reference that teaches or suggests a shaft having "flat threads," nor are any of the cited references seen to disclose such threads. See MPEP §706.02(j)(A). Moreover, as stated previously, the shaft in *Gilbert* '821 "completely avoids the use of threads." Col. 2, line 18. Similarly, none of the other cited references teach or suggest a shaft having "shallow threads." To the contrary, each of the threaded shafts in *Cooper* '964, *Cooper* '525, and *Cooper* '681 cited by the Examiner clearly show the threads as being pointed. See Figure 1 of Cooper '964; Figure 13 of Cooper '525; and Figure 1 of Cooper '681. Accordingly, none of the Cooper references teach or suggest a shaft having "flat threads" or threads that could reasonably be considered "shallow."

Applicant respectfully submits that *Gilbert* '821 is not properly combined with *Cooper* '964, *Cooper* '525, or *Cooper* '681 because *Gilbert* '821 explicitly teaches away from the use of

a threaded shaft and states: “[t]he shaft requires minimal machining, and **it completely avoids the use of threads.**” The impeller-shaft connection is made by providing an opening through the center of the impeller and placing the shaft in the opening. The impeller is cemented to the end of the shaft to prevent axial separation.” Col. 2, lines 18-21 (emphasis added). Not only does *Gilbert* ‘821 expressly teach away from the use of a threaded shaft, the use of threads would interfere with cementing the shaft to the impeller, changing the principle of operation of the reference and/or rendering the invention unsatisfactory for its intended purpose. If a proposed modification would render the invention disclosed in a cited reference unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the modification. *In re Gordon*, 733 F.2d 900 (Fed. Cir. 1984); *In re Ratti*, 270 F.2d 810 (C.C.P.A. 1959); see MPEP §2143.01.V-VI. Accordingly, *Gilbert* ‘821 is not properly combined with any of the Cooper references to establish a case of *prima facie* obviousness with respect to claim 8.

CONCLUSION

In view of the amendments and arguments herein, reconsideration is respectfully requested. Applicant believes the case is in condition for allowance and respectfully requests withdrawal of the rejections and allowance of the pending claims.

Applicant reserves the right to prosecute any cancelled claims or additional claims, including claims of broader scope, in a continuation application.

Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to **Deposit Account No. 19-3878**.

The Examiner is invited to telephone the undersigned at the telephone number listed below if it would in any way advance prosecution of this case.

Respectfully submitted,

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